

K-1688C

U.S. Patent Application Serial No. 10/679,924
Filed: October 6, 2003

RESPONSE TO THE FINAL OFFICE ACTION OF NOVEMBER 26, 2004

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LISTING OF CLAIMS

The following is a listing of the claims that will replace all prior versions of the claims in this patent application:

Claims 1-50 cancelled.

51. (Previously Presented) A SiAlON ceramic body made from a starting powder mixture that includes silicon nitride powder and one or more powders that provide aluminum, oxygen, nitrogen, and a rare earth to the SiAlON ceramic body, the SiAlON ceramic body comprising:

a two phase composite comprising an alpha prime SiAlON phase and a beta prime SiAlON phase, and the alpha prime SiAlON phase containing the rare earth therein;

the alpha prime SiAlON phase being present in an amount greater than or equal to about 20 weight percent of the two phase composite;

the starting silicon nitride powder comprises at least about 70 weight percent of the starting powder mixture, the silicon nitride powder in the starting powder mixture contains beta-silicon nitride powder wherein the beta-silicon nitride powder comprises less than or equal to about 1.6 weight percent of the starting silicon nitride powder; and

the SiAlON ceramic body having a Vickers hardness (18.5 Kg load) equal to or greater than about 16.5 GPa, and a fracture toughness (K_{IC}) equal to or greater than about 5.5 MPam^{1/2}.

52. (Previously Presented) The SiAlON ceramic body of claim 51 wherein at least some of a silicon component of the alpha prime SiAlON phase originates from the silicon nitride powder in the starting powder mixture, and at least some of the silicon component of the beta prime SiAlON phase originates from the silicon nitride powder in the starting powder mixture.

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53. (Previously Presented) The SiAlON ceramic body of claim 51 having a Vickers hardness (18.5 Kg load) equal to at least about 17.5 GPa and a fracture toughness as measured by the Evans & Charles method equal to at least about $6.0 \text{ MPa}\cdot\text{m}^{1/2}$.

54. (Previously Presented) The SiAlON ceramic body of claim 51 having a Vickers hardness (18.5 Kg load) equal to at least about 18.5 GPa and a fracture toughness as measured by the Evans & Charles method equal to at least about $7.0 \text{ MPa}\cdot\text{m}^{1/2}$.

55. (Presently Amended) The SiAlON ceramic body of claim 51 having a Vickers hardness (18.5 Kg load) equal to at least about 19.5 GPa and a fracture toughness as measured by the Evans & Charles method equal to at least about $8.0 \text{ MPa}\cdot\text{m}^{1/2}$.

56. (Previously Presented) The SiAlON ceramic body of claim 51 wherein the beta prime SiAlON phase being of the formula $\text{Si}_{6-z}\text{Al}_z\text{O}_z\text{N}_{8-z}$ wherein z is greater than 0.3 and less than 1.5.

57. (Previously Presented) The SiAlON ceramic body of claim 51 wherein z is greater than 0.7 and less than 1.5.

58. (Previously Presented) The SiAlON ceramic body of claim 51 wherein z is greater than 0.3 and less than 0.6.

59. (Previously Presented) The SiAlON ceramic body of claim 51 wherein the alpha prime SiAlON phase being present in an amount between about 60 weight percent and about 80 weight percent of the two phase composite.

60. (Previously Presented) The SiAlON ceramic body of claim 51 wherein the alpha prime SiAlON phase being present in an amount between about 45 weight percent and about 85 weight percent of the two phase composite.

61. (Presently Amended) A SiAlON ceramic body made from a starting powder mixture that includes silicon nitride powder and one or more powders that provide aluminum, oxygen, nitrogen, and a rare earth to the SiAlON ceramic body, the SiAlON ceramic body comprising: